

REMARKS

STATUS OF THE CLAIMS

Claims 1, 5-11, 15, 18, 22, 24, 27, 30-38, 40, 43, 44 and 46 have pending.

Claims 1, 5-11, 15, 18, 22, 24, 27, 30-38, and 40 are rejected.

Claim 34 is rejected under 35 U.S.C. § 112, second paragraph, for allegedly providing insufficient antecedent basis for "the stationary contacts of the second substrate."

Claims 43, 44 and 46 are allowed.

In accordance with the foregoing, the claims are amended, claim 9 is cancelled, without prejudice or disclaimer, and claim 68 is added, and, thus, the pending claims remain for reconsideration, which is respectfully requested.

No new matter has been added.

The Examiner's rejections are respectfully traversed.

35 U.S.C. § 112, SECOND PARAGRAPH, REJECTIONS:

Claim 34 is rejected under 35 U.S.C. § 112, second paragraph, for allegedly providing insufficient antecedent basis for "the stationary contacts of the second substrate." In accordance with the foregoing, claim 34 is amended, taking into consideration the Examiner's comments. Applicants respectfully submit that claim 34, as amended, complies with the requirements of 35 U.S.C. § 112, second paragraph. Accordingly, withdrawal of the claim rejection is respectfully requested.

CLAIM REJECTIONS:

Claim 15 is rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Seki et al., U.S. Patent Number 6,734,513, hereinafter referred to as "Seki."

The Office Action, at page 3, lines 5-8 asserts that Seki discloses "a moveable plate [20] arranged between the first and second substrates, the moveable plate having a frame [22, 23, 30] and a movable portion, the frame being sandwiched between the first and second substrates to realize a hermetical sealed structure [Fig. 4]." Therefore, the Examiner is asserting the anchor 22, support beams 23 and glass frit 30 of Seki disclose the claimed "movable plate." Applicants respectfully disagree with the Examiner's assertions, because Seki at column 5, line 49 to column 6, line 12, discusses:

As shown in FIGS. 8A and 13A, an SOI (silicon-on-

insulator) wafer 29 having a single crystal silicon wafer having crystal orientation (100) is prepared. To secure a desired support beam thickness and movable electrode thickness, **an anchor 22 is formed by performing TMAH (alkaline etching liquid) etching on the surface of the SOI wafer 29** on the side of an active layer 29a (see FIGS. 8B and 13B). ...

The SOI wafer 29 is positioned with respect to the base wafer 10 and positive electrode joining is performed (see FIGS. 9A and 14A). ... Slits 21 and 25 are formed in the remaining active layer 29a of the SOI wafer 29 by dry etching, whereby a movable electrode 24 and a movable contact piece 26 are defined (see FIGS. 9C and 14C).

In other words, Seki discusses an anchor 22, which is secured to the base wafer 10, as can clearly be seen, for example, in Seki Figs. 4, 9C and 14C. Seki further discusses, at column 5, lines 12-18:

As shown in FIG. 3, **the movable element 20 is such that a movable electrode 24 is supported via four support beams 23 extending from a planar, generally C-shaped anchor 22** so as to be driven in the thickness direction. The support beams 23 are formed by forming slits 21. In the movable electrode 24, a movable contact piece 26 is defined by two slits 25, 25 that are juxtaposed at the center of the movable electrode 24.

In other words, the "moveable element 20" of Seki is supported via "support beams 23," which are connected to the anchor 22 of Seki, which as discussed above, is secured to the base wafer 10. In contrast, claim 1, for example, recites "the movable plate having comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, and a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame." Support for the claim amendment can be found, for example, in the Specification in Fig. 3 (22) and Figs. 14, 15A and 15B, and at page 15, lines 1-11, which recites:

The movable plate 20 is formed by using a semiconductor material such as silicon single-crystal. The movable plate 20 includes a frame 25 shaped into a ring, and a movable portion 21, which moves up and down within the frame 25. The direction in which the movable portion 21 moves up and down is perpendicular to the plate surfaces of the cap substrate 10 and the stationary substrate 30. In order to realize the up/down movement of the movable portion 21, the movable portion 21 is connected to the frame 25 by hinge springs 22 that are elastically deformable members.

Seki further discusses, at column 6, lines 16-20:

As shown in FIGS. 11A and 16A, the cap wafer 40 is bonded to the base wafer 10 with the glass frit 30 interposed in between by

heating and pressurization so that the cap wafer 40 and the base wafer 10 are integrated with each other.

In other words, Seki discusses that a cap wafer and a base wafer are sealed together with a glass frit 30. Therefore applicants assume the Examiner allegedly corresponds the "glass frit 30" of Seki with the claimed "frame being sandwiched between the first and second substrates to realize a hermetical sealed structure." However, as discussed above, the "moveable element" of Seki is connected to an anchor, which is secured to a base wafer. Therefore, Applicants respectfully submit that Seki fails to disclose, either expressly or inherently (or necessarily) the claimed "the movable plate having comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, and a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame," because Seki secures its movable element to the base wafer and does not suspend "the movable portion from the frame" as recited in the claim 15.

Claims 1, 5, 8-11, 18, 22 and 40 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Seki, in view of DeReus, U.S. Patent Number 6,876,482, hereinafter referred to as "DeReus."

Independent claims 1, 5, and 18 are allegedly unpatentable over Seki in view of DeReus.

The Examiner relies upon Seki to disclose the claimed "movable plate." As discussed above, Seki fails to disclose or suggest the claimed "the movable plate having comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, and a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame."

The Examiner relies up DeReus to discuss the claimed "multiple contacts," as claimed in claims 1 and 5, and the claimed "wherein the movable portion has protrusions that prevent the movable portion from sticking to the first substrate," as claimed in claim 18. DeReus merely discusses a MEMS device having a standoff bump, and thus fails to correct the deficiencies of Seki. Therefore Applicants respectfully submit that a prima facie case of obviousness cannot be based upon Seki and DeReus, because Seki, DeReus and any combination thereof fails to disclose or suggest the claimed "the movable plate having comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, and a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame," as recited in independent claims 1, 5 and 18.

Dependent claims recite patentably distinguishing features of their own or are at least patentably distinguishing due to their dependence from the independent claims. Withdrawal of the rejection of pending claims, and allowance of pending claims is respectfully requested.

Independent claims 37 and 38 and dependent claims 6 and 7 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Seki, in view of DeReus, in further view of Hyman et al., U.S. Patent Number 6,504,118, hereinafter referred to as "Hyman."

The Examiner relies upon Seki to disclose the claimed "a movable plate." As discussed above, Seki, DeReus and any combination thereof fails to disclose or suggest the claimed "the movable plate having comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, and a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame," as recited, for example, in independent claim 1.

Hyman is relied upon to allegedly disclose the claimed "wherein the second substrate has a stationary contact facing the movable contact," as recited in claims 37 and 38. However, Hyman discusses, at column 10, lines 29-34:

FIG. 1 is a functional plan-view schematic of one general class of embodiments of this invention, wherein one cantilever load armature and **one cantilever latch armature are fixed at a common end and free to deflect at the opposing end**, these free ends being mechanically coupled together by means of a contact armature. (emphasis added)

In other words, Hyman discusses that a deflectable armature is fixed to one end of a relay. Hyman further discusses a deflectable armature that is fixed to both ends of the Relay, (see, for example Hyman, Figs. 13A-13C). Hyman further discusses, at column 28, lines 1-27:

... It is recognized that **the fixed-beam of the dual thermal bimorph actuators results in a constrained range of motion** relative to a cantilever arrangement.

... In a similar manner as with the previous embodiments, FIG. 13B is a cross-sectional schematic of a device in the stable first active state, wherein the mechanical limitations of the device prevent further armature deflection. The closing actuator of FIG. 13B is curled in a downward direction from the close down control signal, **though severely constrained by the fixed beam condition and bending forces of the contact armatures.**

In other words, Hyman discusses that a deflectable armature is fixed to both ends of a relay, but its movement is "severely constrained" because of its fixed condition. Therefore, Hyman fails to disclose or suggest the claimed "the movable plate having comprising a frame

sandwiched between the first and second substrates to realize a hermetical sealed structure, and-a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame," because Hyman fixes the armature to a relay and does not disclose or suggest "a plurality of elastically deformable members suspending the movable portion from the frame." Therefore, Hyman fails to correct the deficiencies of Seki and DeReus. Accordingly, Applicants respectfully request withdrawal of the claim rejections.

Independent claims 24, 27 and 30-36 are rejected under 35 U.S.C. § 103(a) as being unpatentable of Seki, in view of Hyman.

The Examiner relies upon Seki to disclose the claimed "movable plate." As discussed above, Seki fails to disclose or suggest the claimed "the movable plate having comprising a frame sandwiched between the first and second substrates to realize a hermetical sealed structure, and-a movable portion and a plurality of elastically deformable members suspending the movable portion from the frame."

Furthermore, as discussed above, Hyman only discusses fixing both ends of an armature to the relay, and, thus, fails to correct the deficiencies of Seki. Accordingly, Applicants respectfully request withdrawal of the claim rejections.

ALLOWABLE SUBJECT MATTER:

The Office Action, at page 16, indicated that claims 43, 44, 46 are allowed. Furthermore, applicants respectfully submit independent claims 1, 15, 18, 24, 27, 30-38 patentably distinguish over the cited prior art and are allowable.

NEW CLAIM

New claim 68 recites:

68. (NEW) A micro-relay comprising:
- a first substrate having a contact as a stationary contact and an electrode as a stationary electrode;
 - a second substrate facing the first substrate; and
 - a movable plate arranged between the first and second substrates,
- the movable plate including:
- a frame sandwiched between the first and second substrates forming a hermetical sealed structure,
 - a portion having an electrode as a movable electrode facing the stationary electrode, and a contact as a movable contact facing the stationary contact, and

a plurality of elastically deformable members
suspending the portion from the frame.

As discussed above, Seki, DeReus, Hyman and any combination thereof fail to disclose or suggest the claimed "movable plate including: a frame sandwiched between the first and second substrates forming a hermetical sealed structure, a portion having an electrode as a movable electrode facing the stationary electrode, and a contact as a movable contact facing the stationary contact, and a plurality of elastically deformable members suspending the portion from the frame," as recited in claim 68. Accordingly, Applicants respectfully submit claim 68 patentably distinguishes over the cited prior art for similar reasons as the other independent claims.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.


Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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